

Appl. No. : 09/386,247
Filed : August 31, 1999

AMENDMENTS TO THE CLAIMS

IN THE CLAIMS:

Please cancel Claims 15, 16 and 79 without prejudice, as indicated below.

A complete listing of all claims is presented below.

1-5. (Cancelled)

6. (Previously Presented) An ozone shower system, comprising:
an ozone source configured to supply ozone to a process chamber;
at least one semiconductor workpiece positioned within a cassette, the cassette having a top and a bottom;
at least two rotating axles within the process chamber, the two rotating axles positioned to support the semiconductor workpiece in a manner that creates a gap between the semiconductor workpiece and the bottom of the cassette so that the cassette can remain stationary while the rotating axles rotate the semiconductor workpiece;
a sprayer positioned above the top of the cassette, the sprayer connected to a fluid source such that fluid sprays over the semiconductor workpieces in the process chamber;
a pump connected to a fluid source; and
a selector valve connected to the pump, the selector valve configured to selectively pulse the fluid through the sprayer.

7. (Original) The ozone shower system of Claim 6 wherein the workpiece is a semiconductor wafer.

8. (Original) The ozone shower system of Claim 7 further comprising a cassette that holds a plurality of semiconductor wafers.

9. (Original) The ozone shower system of Claim 8 wherein the cassette is configured to rotate.

10-16. (Cancelled)

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17. (Previously Presented) An apparatus comprising:
 - at least one wafer processing chamber wherein an ozone rich environment exists within the wafer-processing chamber;
 - a rotator that creates a gap between a wafer and a wafer cassette, wherein the rotator rotates the wafer while allowing the cassette to remain substantially stationary;
 - a sprayer; and
 - a pulsating fluid source, the pulsating fluid source configured to pulse a solution through the sprayer into the ozone rich environment.
18. (Original) The apparatus of Claim 17 wherein the solution is ozone rich.
19. (Original) The apparatus of Claim 17 wherein the solution combines with the ozone in the ozone rich environment.
20. (Original) The apparatus of Claim 17 wherein the sprayer comprises a plurality of spray nozzles.
21. (Cancelled)
22. (Original) The apparatus of Claim 17 wherein the pulsating fluid source is configured to pulse at approximately one pulse every two seconds.
23. (Previously Presented) The apparatus of Claim 17 wherein the pulsating fluid source is configured to pulse at range from approximately one pulse every two seconds to approximately five pulses every minute.
24. (Original) The apparatus of Claim 17 wherein the pulsating fluid source has a 50% duty cycle.
25. (Cancelled)
26. (Original) The apparatus of Claim 17 wherein the pulsating fluid source have a duty cycle the varies from 3% to 97%.

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27. (Previously Presented) An apparatus comprising:
at least one semiconductor processing chamber;
a rotator that creates a gap between a wafer and a wafer cassette, wherein the rotator rotates the wafer; and
a pulsating fluid source, the pulsating fluid source configured to pulse an ozone-rich solution into the semiconductor-processing chamber.
28. (Original) The apparatus of Claim 27 wherein the ozone-rich solution further combines with ozone in the semiconductor processing chamber.
29. (Original) The apparatus of Claim 27 further comprising a spray nozzle that directs the pulsating fluid into the semiconductor-processing chamber.
30. (Cancelled)
31. (Original) The apparatus of Claim 27 wherein the pulsating fluid source is configured to pulse at approximately one pulse every two seconds.
32. (Previously Presented) The apparatus of Claim 27 wherein the pulsating fluid source is configured to pulse at range from approximately one pulse every two seconds to approximately five pulses every minute.
33. (Original) The apparatus of Claim 27 wherein the pulsating fluid source has a 50% duty cycle.
34. (Cancelled)
35. (Original) The apparatus of Claim 27 wherein the pulsating fluid source have a duty cycle the varies from 3% to 97%.
- 36-62. (Cancelled)
63. (Previously Presented) An apparatus for removing a portion of a semiconductor workpiece, the apparatus comprising:

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a fluid source configured to vary a fluid from a greater flow to a lesser flow, wherein a duty cycle of the varying fluid comprises an amount of time the fluid flows at the greater flow versus an amount of time the fluid flows at the lesser flow plus the amount of time the fluid flows at the greater flow;

one or more nozzles capable of spraying the varying fluid over a semiconductor workpiece; and

at least one rotator configured to at least partially separate the semiconductor workpiece from a carrier, the rotator further configured to rotate the semiconductor workpiece at one or more speeds to, in conjunction with one or more duty cycles of the varying fluid, to control a thickness of a boundary layer of the varying fluid on the workpiece,

wherein varying the thickness of the boundary layer varies an amount of ozone that is transferred to the workpiece and wherein the ozone and the varying fluid enhance the removal of a portion of the workpiece.

64. (Original) The apparatus of Claim 63, wherein the lesser flow comprises substantially no flow, thereby creating a pulse of fluid during the greater flow.

65. (Cancelled)

66. (Original) The apparatus of Claim 63, wherein the varying fluid varies from the lesser flow to the greater flow at approximately one time every two seconds.

67. (Original) The apparatus of Claim 63, wherein the varying fluid varies from the lesser flow to the greater flow at a range of approximately one time every two seconds to approximately five times every minute.

68. (Original) The apparatus of Claim 63, wherein the one or more duty cycles include a 50% duty cycle.

69. (Cancelled)

70. (Original) The apparatus of Claim 63, wherein the one or more duty cycles include a range of duty cycles between 3% and 97%.

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71. (Original) The apparatus of Claim 63, wherein the one or more duty cycles vary between 3% and 97%.

72. (Previously Presented) The apparatus of Claim 63, wherein the one or more speeds include a range of speeds not exceeding approximately 100 revolutions per minute (RPM).

73. (Previously Presented) The apparatus of Claim 63, wherein the one or more speeds are below approximately 100 RPM .

74. (Previously Presented) The apparatus of Claim 63, wherein the one or more speeds include 3 RPM.

75. (Original) The apparatus of Claim 63, wherein a temperature of the varying fluid ranges from approximately 20°C to approximately 95°C.

76. (Original) The apparatus of Claim 63, wherein a temperature of the varying fluid ranges from approximately 60°C to approximately 95°C.

77-79. (Cancelled)